

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 0 865 036 A3

(12)

## EUROPEAN PATENT APPLICATION

(88) Date of publication A3:  
18.08.1999 Bulletin 1999/33

(51) Int Cl.<sup>6</sup>: G11B 7/09

(43) Date of publication A2:  
16.09.1998 Bulletin 1998/38

(21) Application number: 98301576.9

(22) Date of filing: 03.03.1998

(84) Designated Contracting States:  
AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC  
NL PT SE  
Designated Extension States:  
AL LT LV MK RO SI

- Sakurai, Tatsuaki c/o Ricoh Company, Ltd.  
Ota-Ku Tokyo 143 (JP)
- Kudou, Ryuuji  
yokohama-shi 240-0052 (JP)

(30) Priority: 12.03.1997 JP 5731297

(71) Applicant: Ricoh Company, Ltd  
Ohta-ku Tokyo 143 (JP)

(74) Representative: Senior, Alan Murray et al  
J.A. KEMP & CO.,  
14 South Square,  
Gray's Inn  
London WC1R 5LX (GB)

(72) Inventors:  
• Sofue, Masaaki c/o Ricoh Company, Ltd.  
Ota-Ku Tokyo 143 (JP)

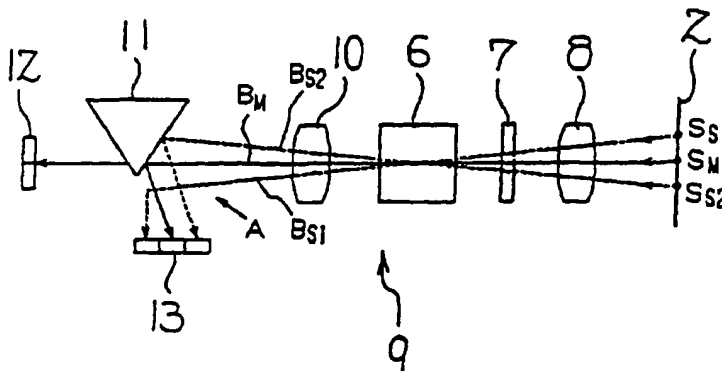
## (54) Optical pick-up apparatus

(57) An optical pick-up apparatus using the knife edge method to detect focus errors is arranged so that the sub-spot ( $S_{s1}$ ) which gives rise to the sub-beam ( $B_{s1}$ ) which is intercepted in the detection optical system by the knife edge (11) to a lesser extent is positioned on the optical disc (2) ahead of the main spot in the recording direction. The sub-spot ( $S_{s2}$ ) giving rise to the detection sub-beam ( $B_{s2}$ ) which is intercepted by the knife

edge in the detection optical system to a greater extent is located on the disc behind the main spot relative to the recording direction. In this manner an imbalance in the amount of light from each sub-beam reflected by the knife edge to the tracking error photodetector is compensated for by an imbalance in the reflectivities of the non-recorded portion ahead of the main beam and the recorded portion behind the main beam.

FIG 1(a)

(a)





European Patent  
Office

# EUROPEAN SEARCH REPORT

Application Number  
EP 98 30 1576

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	US 5 033 040 A (FUJITA TERUO) 16 July 1991 * abstract; figures 10-14 * * column 1, line 20 - column 4, line 29 * ---	1-3	G11B7/09
A	EP 0 452 028 A (NIPPON CONLUX CO LTD ;NHK SPRING CO LTD (JP)) 16 October 1991 * abstract; figures 1,2 * * column 4, line 33 - column 8, line 11 * ---	1-3	
A	EP 0 426 053 A (NIPPON CONLUX CO LTD) 8 May 1991 * abstract; figures 1-13 * * column 4, line 56 - column 14, line 3 * ---	1-3	
A	US 4 498 159 A (DAIMON MASAHIRO) 5 February 1985 * abstract; figures 1-3 * * column 1, line 20 - column 3, line 20 * ---		
A	EP 0 323 320 A (COPAL CO LTD) 5 July 1989 * abstract * * column 1, line 12 - column 3, line 30 * * column 9, line 60 - column 12, line 25 * ---		TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	US 4 532 522 A (TSUNODA YOSHITO ET AL) 30 July 1985 * abstract; figures 1A-2B * * column 1, line 9 - column 2, line 15 * * column 2, line 45 - column 3, line 57; figure 3 * -----		G11B
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>28 June 1999</b>	Examiner <b>Pariset, N</b>
<p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document</p> <p>T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &amp;: member of the same patent family, corresponding document</p>			

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 30 1576

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-06-1999

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5033040	A	16-07-1991	JP 1913243 C	09-03-1995
			JP 6038291 B	18-05-1994
			JP 63317932 A	26-12-1988
			WO 9205546 A	02-04-1992
-----				
EP 0452028	A	16-10-1991	JP 2711010 B	10-02-1998
			JP 4001932 A	07-01-1992
			DE 69110339 D	20-07-1995
			DE 69110339 T	07-03-1996
			US 5185729 A	09-02-1993
-----				
EP 0426053	A	08-05-1991	JP 2710675 B	10-02-1998
			JP 3142720 A	18-06-1991
			AU 640176 B	19-08-1993
			AU 6555490 A	02-05-1991
			CA 2028562 C	18-07-1995
			CA 2028562 A	01-05-1991
			DE 69022951 D	16-11-1995
			DE 69022951 T	14-03-1996
			ES 2080776 T	16-02-1996
			US 5084851 A	28-01-1992
-----				
US 4498159	A	05-02-1985	JP 58147823 A	02-09-1983
			DE 3306144 A	01-09-1983
			NL 8300705 A	16-09-1983
-----				
EP 0323320	A	05-07-1989	JP 1171129 A	06-07-1989
			DE 3888157 D	07-04-1994
			DE 3888157 T	01-06-1994
			US 5062096 A	29-10-1991
-----				
US 4532522	A	30-07-1985	JP 1950905 C	10-07-1995
			JP 6075297 B	21-09-1994
			JP 58037848 A	05-03-1983
			AT 36617 T	15-09-1988
			CA 1182911 A	19-02-1985
			DE 3278923 A	22-09-1988
			EP 0073066 A	02-03-1983
-----				